

1969

**OPERATING
SUMMARY**

NEPEAN

***water pollution
control plant***

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JUN 26 1970

ONTARIO WATER
RESOURCES COMMISSION

ONTARIO WATER RESOURCES COMMISSION

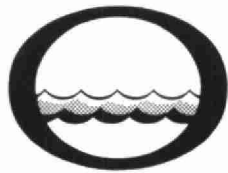
Division of Plant Operations

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Water management in Ontario

Ontario
Water Resources
Commission


135 St. Clair Ave. W.
Toronto 195
Ontario

The operating efficiency and financial status of the water pollution control facilities operated for you in 1969 are presented in the following pages.

The regional operations engineer's comments and the statistical data will assist you in gauging the plant's level of performance. A new flow chart and up-to-date design data are also provided.

Various divisions and sections within the Commission have co-operated in providing what we trust is an accurate and concise annual operating summary.


D.S. Caverly,
General Manager.


D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.



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NEPEAN
water pollution control plant

operated for

THE TOWNSHIP OF NEPEAN

by the

ONTARIO WATER RESOURCES COMMISSION

1969 ANNUAL OPERATING SUMMARY

TOWNSHIP OF NEPEAN WATER POLLUTION CONTROL PLANT

The diagram illustrates the wastewater treatment process at the Township of Nepean Water Pollution Control Plant. The flow begins with **INFLUENT** entering the **BARMINUTOR AND GRIT CHANNELS**. From there, the water moves to the **PRIMARY SEDIMENTATION TANKS**. **SUPERNATANT** from these tanks is directed to the **DIGESTER**. **RAW SLUDGE** is also sent to the **DIGESTER**, where it produces **DIGESTED SLUDGE**, which is then transported **TO TANK TRUCK**. The remaining sludge from the primary tanks goes to the **AERATION TANKS**. A **PLANT BYPASS** line connects the influent line to the aeration tanks. The **AERATION TANKS** have a **RETURN ACTIVATED SLUDGE** line that feeds back into the aeration process. **WASTE ACTIVATED SLUDGE** is removed from the aeration tanks and sent to the **DIGESTER**. The effluent from the aeration tanks flows into the **SECONDARY SEDIMENTATION TANKS**. A **AERATION BYPASS** line connects the aeration tanks to the secondary sedimentation tanks. The effluent from the secondary tanks passes through a **CHLORINE CONTACT CHAMBER** before entering the **SAND FILTER**. The final **EFFLUENT TO WATTS CREEK** is discharged from the bottom of the sand filter.

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DESIGN DATA

PROJECT NO.	2-0035-59	TREATMENT	Activated Sludge
DESIGN FLOW	1.50 mgd	DESIGN POPULATION	15,000
BOD - Raw Sewage - Removal	140 mg/l 95%	SS - Raw Sewage - Removal	295 mg/l 90%

PRIMARY TREATMENT

Screening

Type: Manually cleaned
Size: One, 2" spacing

Grit Removal

Type: Channel, manually cleaned
Size: Two $35\frac{1}{2}' \times 3\frac{1}{2}' \times 1\frac{1}{2}'$ (1150 gal each)
Retention: 1.1 min (one channel)

Primary Sedimentation

Type: United Steel (Rex San.)
Size: Two $60' \times 15' \times 9'$ (101,000 gal)
Retention: 1.62 hr
Loading: Surface, 835 gal/ft²/day
Weir, 9,450 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Mechanical; single-pass
Size: Two $90' \times 30' \times 12\frac{1}{2}'$ (67,500 cu ft
or 0.42 mil gal)
Retention: 6.8 hr

Aerators

- Six Ames Crosta

Secondary Sedimentation

Type: United Steel
Size: Four $60' \times 15' \times 9'$ (202,000 gal)
Retention: 3.1 hr
Loading: Surface, 420 gal/ft²/day
Weir, 4,580 gal/ft/day

CHLORINATION

- One W & T Type A-731

Chlorine Contact Chamber

Size: One $32' \times 16' \times 5\frac{1}{2}'$ (17,600 gal)
Retention: 17 min

TERTIARY TREATMENT

Type: Sand filter
Size: Four $175' \times 175'$

OUTFALL

- to Watts Creek

SLUDGE HANDLING

Digestion system - Single-stage

Type: PFT; with floating cover
Size: One $60'$ dia $\times 21'$ swd
(59,200 cu ft or 0.37 mil gal)
Loading: 2.02 lb/cu ft/mo

Disposal

- Lagoons (2)

PUMPING STATIONS

Woodroffe Avenue

Type: Canada Pumps, Buffalo
Size: One 250 gpm @ 46' tdh
One 700 gpm @ 46' tdh
One 1160 gpm @ 46' tdh
Stand-by Engine: Wisconsin
1 Gorman-Rupp T8A 2MGD @ 45' tdh

Shirley's Bay

Type: Canada Pumps
Size: Two 1160 gpm @ 25' tdh
One Gorman Rupp, T8A 2 mgd
One Canada Pump 3160 gpm @ 43' tdh
Wisconsin Engine

'69 REVIEW

The Nepean project comprises a 1.5 mgd treatment plant, two pumping stations and associated forcemains and trunk sewers.

Two new operators in 1969 brought the total number of permanent staff members to five.

Operating problems during the year centred on the habitual overloading of the pumping and treatment facilities. A 40 hp pump installed in the fall of 1968 had increased the capacity of the Woodroffe Ave. pumping station to about four million gallons a day. Despite this, back-up of the sewers in the Crestview subdivision occurred last spring. Remedial measures taken by the Township consisted of operating a 40 hp portable pump at the temporary Crestview pumping station and several smaller portable pumps at locations within the subdivision. All of these pumped to surface water-courses concurrently.

Hydraulic overloading in the spring of the Shirley's Bay pumping station, which delivers all sewage to the treatment plant, resulted in bypassing of the station and subsequent overflow of sewage to Watts Creek. On April 30, 1969, a new 40 hp pump was installed which increased the station capacity from 3.3 mgd to 5.5 mgd, thus ensuring at least primary treatment of most of the flow reaching the Shirley's Bay station.

Major mechanical repairs at the treatment plant included the following:

The shaft, bearings, and drive belt were replaced on the variable speed return sludge pump. The plastic sludge collector shoes for the secondary sedimentation tanks were replaced with cast iron units. A new $3\frac{1}{2}$ hp submersible well pump was purchased for the potable water system at the plant. Two new motors were purchased for the primary sedimentation tank sludge collector drives. The shaft, sleeve and bearings were replaced on the effluent water pump.

At the Woodroffe Ave. pumping station, a new shaft and sleeve were installed on the No. 1 pump and a new shaft, sleeve, and impeller were installed on the No. 2 pump. At Shirley's Bay pumping station, new shafts and bearings were installed on the Nos. 1 and 2 pumps.

EXPENDITURE

The cost of operating the treatment plant and pumping station was \$71,457.17 or \$91.89 per million gallons treated. The 1969 budget was exceeded primarily because of a threefold increase in taxes paid to the Township of Nepean, high maintenance costs for treatment plant and pumping station equipment, and the purchase of an additional boiler for the plant.

PLANT FLOWS and CHLORINATION

The average flow to the plant in 1969 was 2.1 mgd, the same as the previous year. It is believed that increased sewage flows from new developments have been offset by the increased diversion of the Township's sewage directly to the Ottawa sewer system. All sewage east of Merivale Rd. and part of the sewage from the Crestview subdivision is diverted in this manner.

In the summer of 1969, it was decided to chlorinate effluent from the treatment plant on a year-round basis, instead of from April through October only. This resulted from frequent overloading of the plant and consequent deterioration in the effluent quality.

PLANT EFFICIENCY

The average reduction in the BOD and suspended solids of the raw sewage treated at the plant was 72% and 77% respectively. This relatively poor efficiency was due to hydraulic overloading, which resulted in a low food-to-micro-organism ratio (F/M) and low detention time in the aeration tank.

SLUDGE DISPOSAL and DIGESTION

The total volume of raw sludge pumped to the digesters was 3.14 million gallons. The total volume of digested sludge disposed of in the sludge lagoons was 0.9 mil. gal.

CONCLUSIONS and RECOMMENDATIONS

The treatment plant and pumping stations are hydraulically overloaded. This problem has existed for several years and has resulted in inefficient sewage treatment, difficult operation, and considerable bypassing of raw sewage to surface watercourses. Expansion should be expedited regardless of the impending transfer of ownership to the Ottawa-Carleton Regional Government.

PROJECT COSTS

2-0035-59

NET CAPITAL COST	\$1,444,574.46
DEDUCT - Payments from Municipalities	<u>670,000.00</u>
Long Term Debt to OWRC	\$ <u>774,574.46</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969	\$ <u>153,540.09</u>
Net Operating	\$ 71,457.17*
Debt Retirement	15,631.00
Reserve	8,462.88
Interest Charged	<u>43,364.44</u>
TOTAL	\$ <u>138,915.49</u>

RESERVE ACCOUNT

Balance @ January 1, 1969	\$ 40,212.04
Deposited by Municipality	8,462.88
Interest Earned	<u>697.90</u>
	\$ 49,372.82
Less Expenditures	<u>38,290.49</u>
Balance @ December 31, 1969	\$ <u>11,082.33</u>

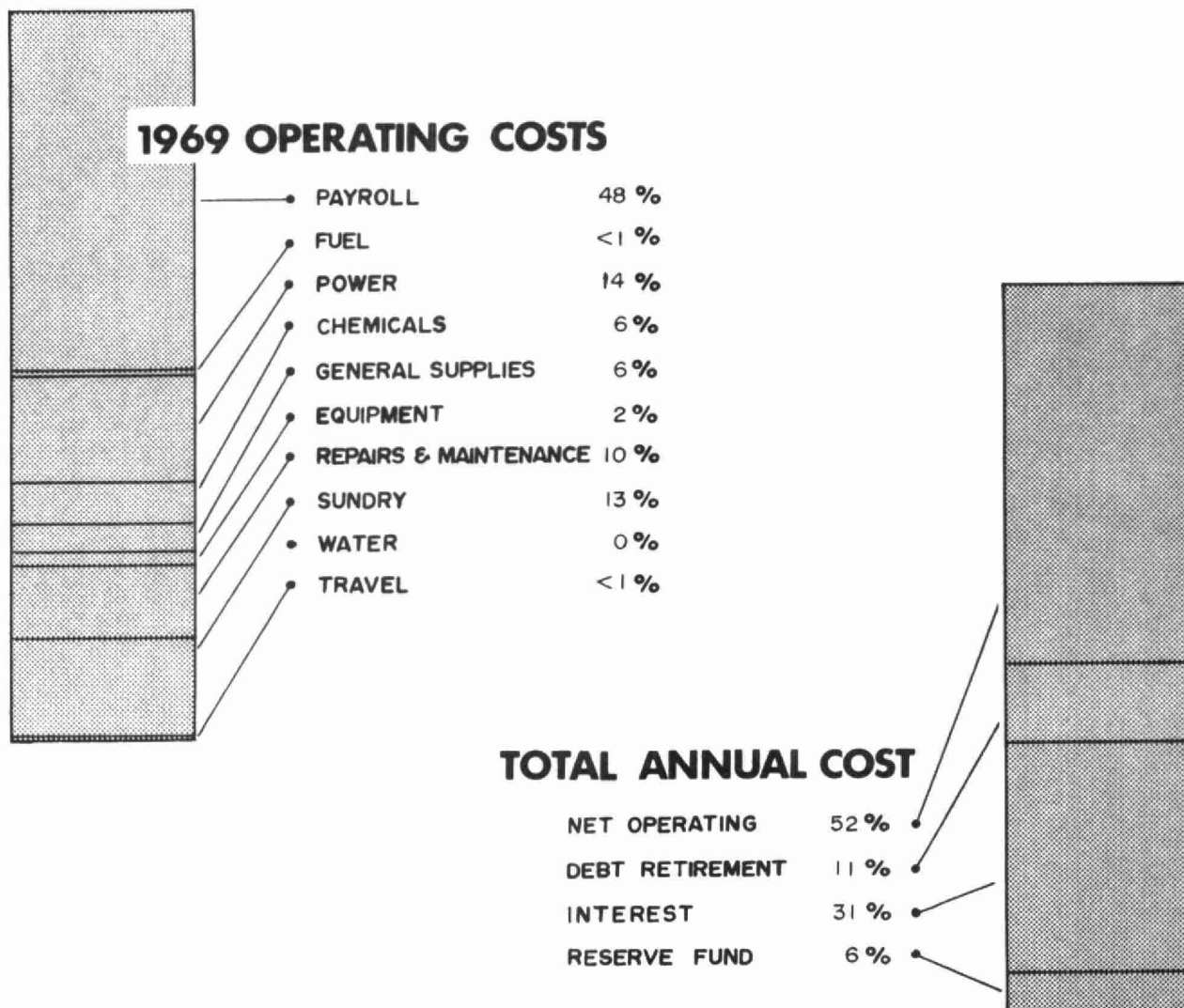
* Not including interest penalty of \$315.43

2-0076-61

NET CAPITAL COST (Final)	
Long Term Debt to OWRC	<u>\$160,984.91</u>
 Debt Retirement Balance at Credit	
(Sinking Fund) December 31, 1969	<u>\$ 32,582.22</u>
 Net Operating	\$
Debt Retirement	3,249.00
Reserve	642.64
Interest Charged	<u>9,012.71</u>
 TOTAL	<u>\$ 12,904.35</u>

RESERVE ACCOUNT

Balance @ January 1, 1969	\$ 7,959.30
Deposited by Municipality	642.64
Interest Earned	<u>466.77</u>
	\$ 9,068.71
 Less Expenditures	<u>-</u>
Balance @ December 31, 1969	<u>\$ 9,068.71</u>



Yearly Operating Costs

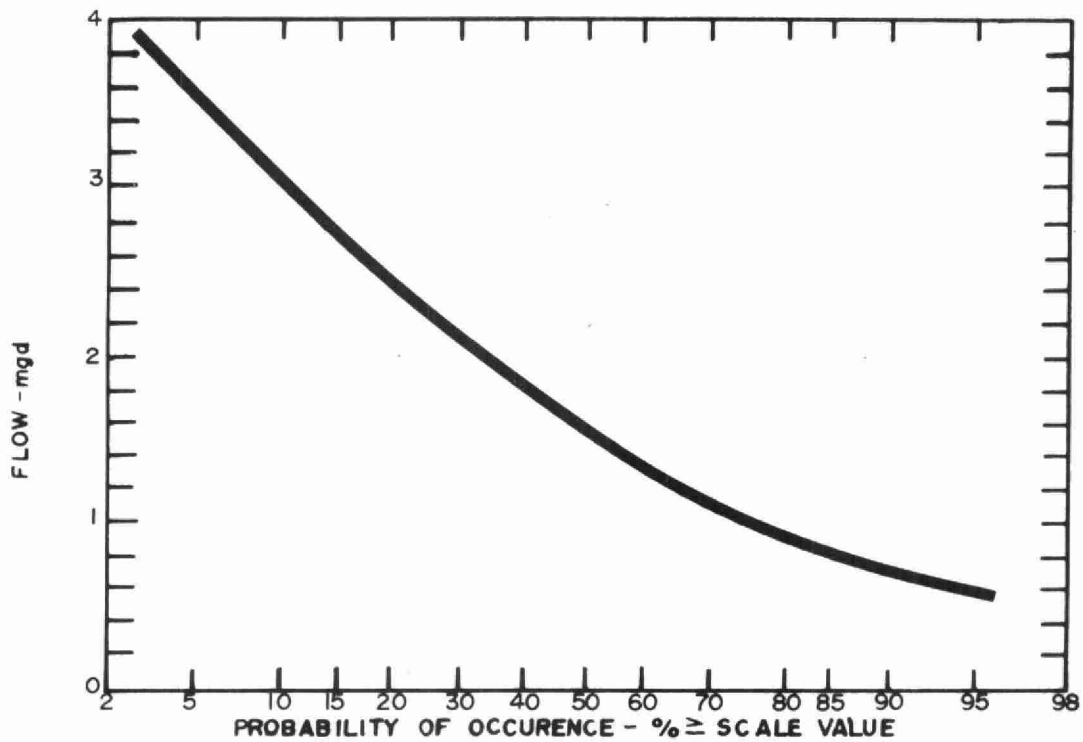
YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1965	726.4	\$31,159.12	\$42.89	7 cents
1966	886.1	32,490.61	36.67	9 cents
1967	1010.5	33,588.90	33.24	16 cents
1968	1025.1	45,317.05	44.21	20 cents
1969	777.6	71,457.17	91.89	15 cents

Monthly Operating Costs

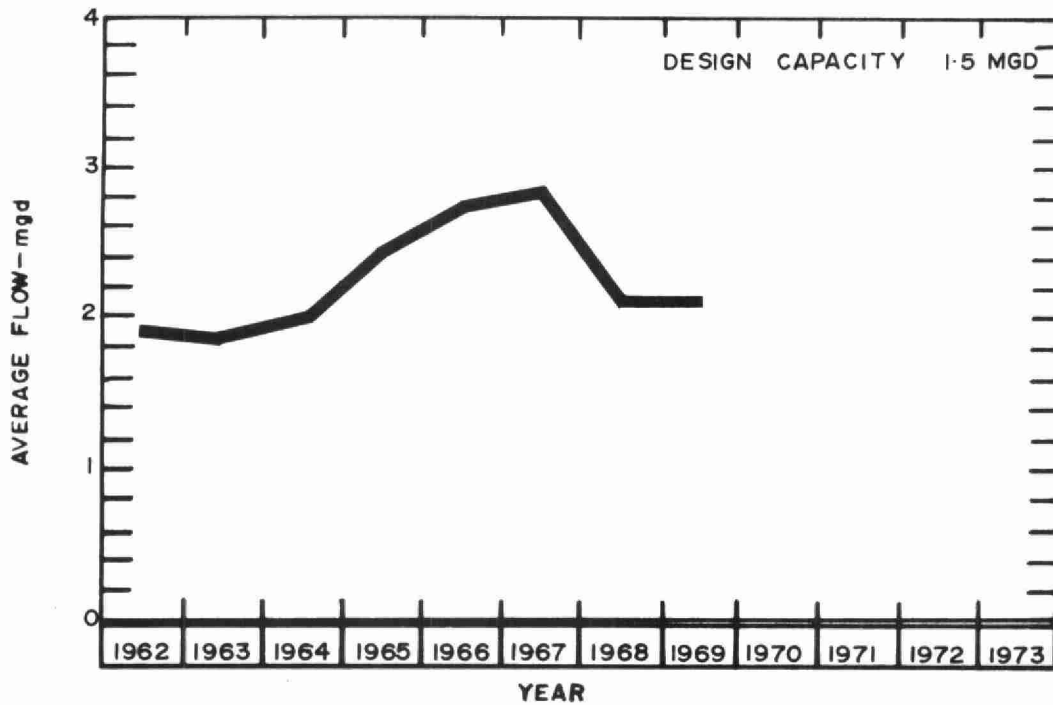
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY	WATER	TRAVEL
JAN	4252.51	2469.25	1017.22	-	608.70	-	82.14	-	25.40	49.80	-	-
FEB	3143.01	1649.92	675.21	-	180.25	-	158.71	48.18	198.26	232.48	-	-
MAR	5163.19	2564.55	-	98.28	1443.96	(429.51)	267.82	-	864.86	353.23	-	-
APR	8237.53	2864.02	-	-	710.90	477.23	593.89	1062.10	315.15	2214.24	-	-
MAY	5340.40	3260.46	-	-	1165.52	-	451.83	21.83	296.36	123.70	-	20.70
JUNE	8000.68	2785.01	-	98.00	1846.22	-	398.62	60.79	1232.47	1579.57	-	-
JULY	3949.52	2592.84	-	-	692.35	-	130.70	139.52	183.99	210.12	-	-
AUG	5698.20	3947.32	-	-	-	-	370.53	101.91	967.43	296.16	-	14.85
SEPT	7922.70	2664.08	-	56.66	1200.25	481.64	191.12	34.65	483.29	2811.01	-	-
OCT	6465.80	2693.55	-	-	584.70	1930.97	327.45	73.17	690.16	66.59	-	99.21
NOV	5777.67	2647.71	-	-	559.40	963.28	290.51	58.08	1007.59	251.10	-	-
DEC	7505.96	2662.08	-	221.11	1329.91	963.28	695.18	15.98	615.60	919.42	-	83.40
TOTAL	71457.17	32800.79	1692.43	474.05	10322.16	4386.89	3958.50	1616.21	6880.56	9107.42	-	218.16

BRACKETS INDICATE CREDIT

PROCESS DATA



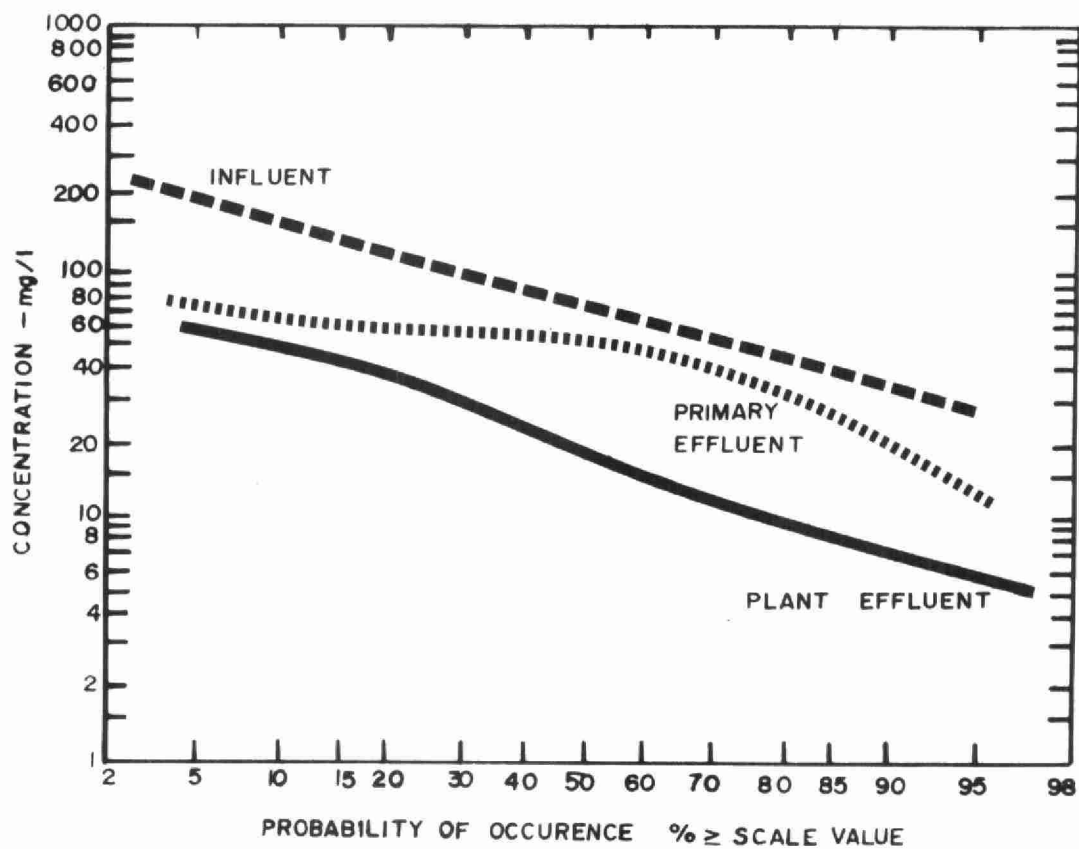
FLWS



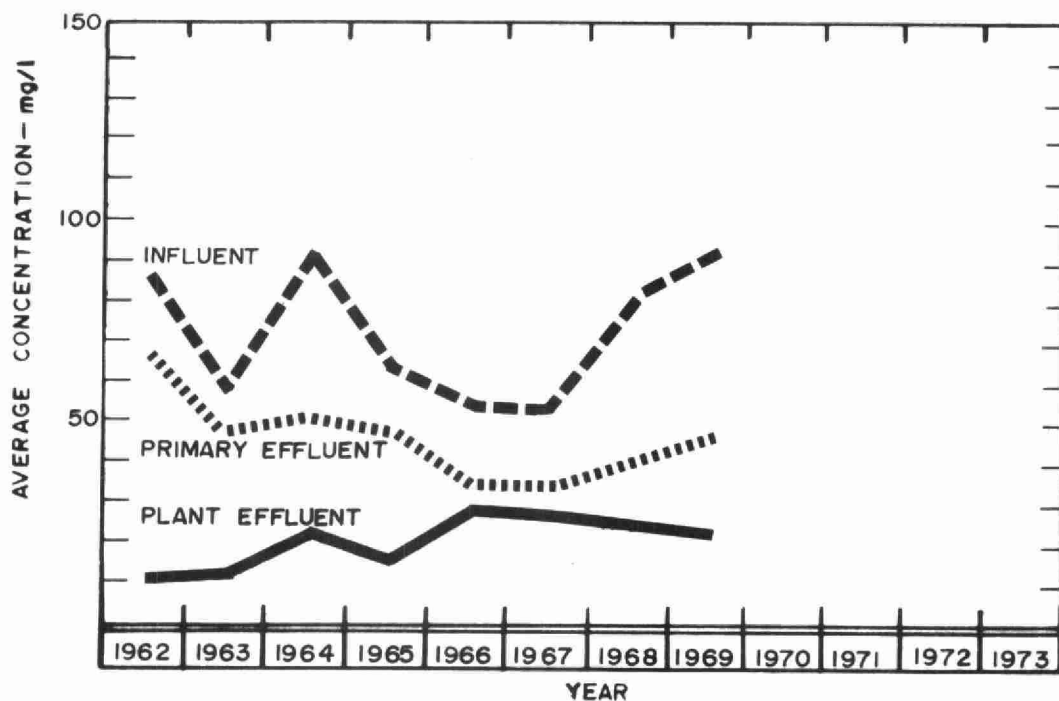
PLANT FLOWS and CHLORINATION

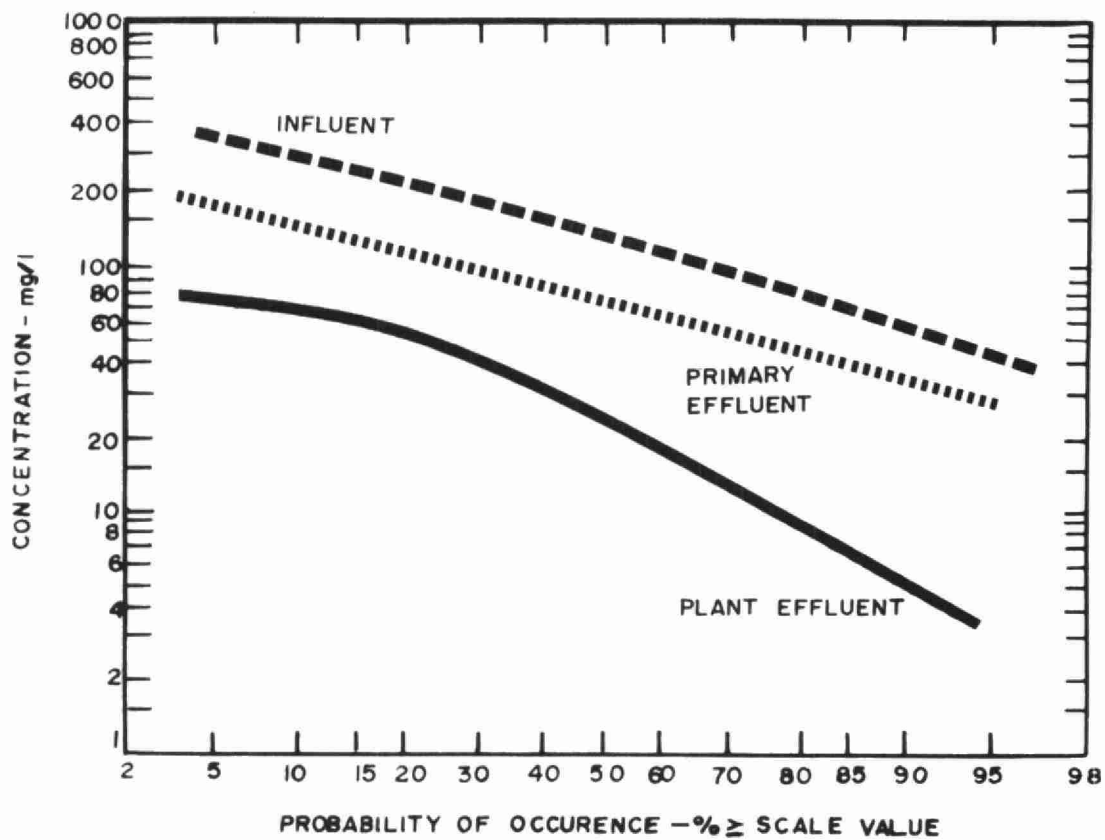
MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10 ³ pounds	DOSAGE mg/l
JAN	51.6	1.7	2.7	1.1	0	0
FEB	59.7	2.1	3.9	1.1	0	0
MAR	66.3	2.1	3.1	1.4	0	0
APR	85.1	2.8	3.0	2.6	1.37*	2.3
MAY	133.1	4.3	4.8	3.3	3.71	2.8
JUNE	64.1	2.1	3.1	1.2	3.73	5.8
JULY	47.3	1.5	4.2	.7	3.37	7.2
AUG	33.3	1.1	2.4	.7	3.02	9.1
SEPT	27.6	.9	1.2	.6	3.11	11.3
OCT	41.4	1.3	2.3	.7	2.94	7.1
NOV	88.1	2.9	4.5	1.2	3.60	4.1
DEC	80.0	2.6	4.9	1.7	4.03	5.0
TOTAL	777.6	-	-	-	28.88	-
AVERAGE	-	2.1	-	-	3.21	5.1

* Chlorination commenced April 9

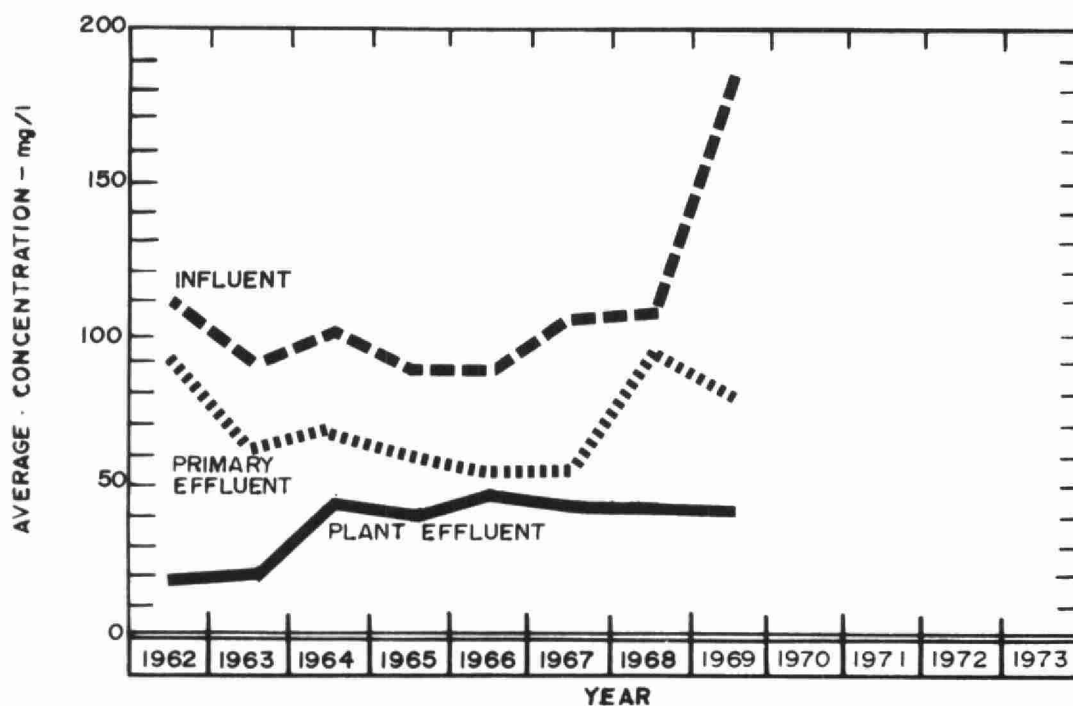


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS

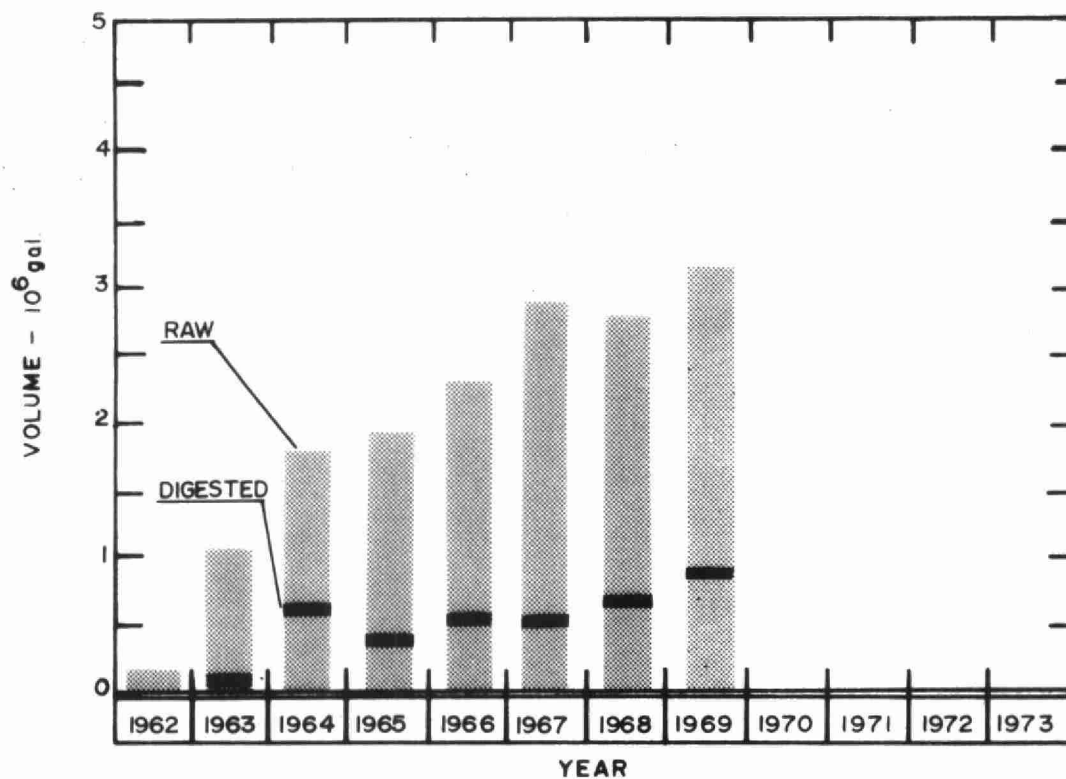


PLANT EFFICIENCY

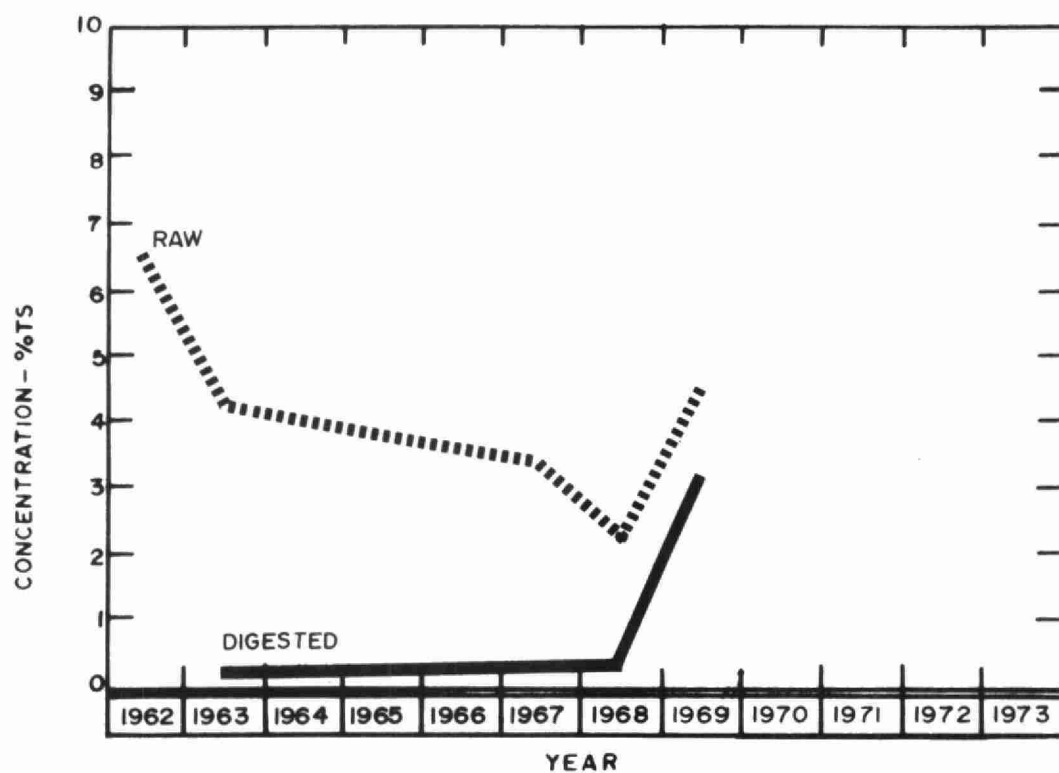
MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT REMOVAL
	INF. mg/l	EFF. mg/l	REDUCTION		INF. CONCN mg/l	EFF. CONCN mg/l	REDUCTION		
			%	10 ³ pounds			%	10 ³ pounds	cu
JAN	48	27	44	10.8	180	30	83	77.4	0
FEB	60	12	80	28.7	100	30	70	41.8	0
MAR	60	9	85	33.8	80	5	94	49.7	0
APR	18	10	44	6.8	40	20	50	17.0	0
MAY	30	17	43	17.3	70	40	42	39.9	0
JUNE	125	18	86	68.6	160	30	81	83.3	0
JULY	75	12	84	29.8	90	15	83	35.5	0
AUG	205	57	72	49.3	870	190	78	226.4	0
SEPT	131	20	85	30.6	270	19	93	69.2	0
OCT	89	37	58	21.5	151	52	66	41.0	0
NOV	57	28	51	25.5	108	43	60	57.2	0
DEC	103	23	78	64.0	88	30	66	46.4	0
TOTAL	-	-	-	-	-	-	-	-	0
AVERAGE	83	23	72	32.2	184	42	77	65.4	0

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		MLSS CONCN mg/l	F/M lb BOD lb MLSS	AIR USED 1000 cu ft lb BOD	WASTE SLUDGE 10 ³ pounds
		BOD	SS	BOD	SS				
		mg/l	mg/l	mg/l	mg/l				
JAN	1.7	35	65	27	30	1970	.07	-	18.5
FEB	2.1	48	70	12	30	2760	.09	-	34.8
MAR	2.1	44	50	9	5	2520	.10	-	36.5
APR	2.8	11	30	10	20	2440	.03	-	31.5
MAY	4.3	18	60	17	40	2820	.07	-	28.1
JUNE	2.1	46	110	18	30	2380	.10	-	43.2
JULY	1.5	24	40	12	15	1610	.06	-	18.2
AUG	1.1	54	230	57	190	2410	.06	-	2.4
SEPT	.9	69	80	20	19	1490	.11	-	8.3
OCT	1.3	56	77	37	52	1380	.14	-	2.8
NOV	3.0	35	75	28	43	2220	.12	-	0
DEC	2.6	57	67	23	30	1350	.27	-	0
TOTAL	-	-	-	-	-	-	-	-	224.3
AVERAGE	2.1	41	80	23	42	2110	.11	-	18.6



DIGESTION



SLUDGE DIGESTION

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT	
	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS
	10 ³ gal	%	%	10 ³ gal	%	%	10 ³ gal	%
JAN	226.	3.7	76	135.	-	-	77.	-
FEB	226.	-	-	60.	-	-	86.	-
MAR	270.	3.0	-	39.	-	-	113.	.5
APR	224.	4.0	46	0	-	-	164.	.4
MAY	254.	3.4	48	0	-	-	168.	.4
JUNE	271.	-	-	67.	-	-	39.	-
JULY	291.	2.4	69	111.	1.1	61	60.	-
AUG	282.	12.0	34	75.	3.9	40	94.	-
SEPT	272.	3.7	52	113.	4.5	42	58.	-
OCT	281.	5.3	57	159.	2.9	49	6.	-
NOV	300.	-	-	94.	2.4	47	63.	-
DEC	238.	3.2	59	48.	4.6	50	84.	-
TOTAL	3135.	-	-	901.	-	-	1012.	-
AVERAGE	261.	4.5	55	75.	3.2	48	84.	.4

[illegible]



Water management in Ontario